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HISTORY OF THE USAF EXPERIMENTAL FLIGHT TEST PILOT SCHOOL 4 FEBRUARY 1951- 12 OCTOBER 1961

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TECHNICAL INFORMATION MEMORANDUM MARCH 1963

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**AIR FORCE FLIGHT TEST CENTER
EDWARDS AIR FORCE BASE, CALIFORNIA
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE**



HISTORY OF THE USAF EXPERIMENTAL FLIGHT TEST PILOT SCHOOL 4 FEBRUARY 1951- 12 OCTOBER 1961



FOREWORD

The narrative that follows describes briefly some of the early attempts made to move the AMC Test Pilot School from Wright-Patterson Air Force Base to Edwards Air Force Base. Included also is a summary of the problems and achievements made by the school once it had been moved to the Mojave Desert. The narrative covers in some detail the difficulties encountered by the first Commandant, Major John R. Amann.


Primarily, Major Amann's task centered in the determination of: test pilot requirements, type organization needed to serve the test pilot requirement, up-dating school aircraft, developing an adequate curriculum to graduate qualified test pilots, applicant qualifications to attend the school, and assignment of graduates. It is significant to note that the assignment of graduates entirely within the Air Research and Development Command although students for the school had been drawn from units Air Force-wide threatened to dry up the source of applicants at one time. This situation tended also to deprive qualified applicants from attending the school by creating a hesitancy on the part of other commands to submit applications of personnel that would not be returned.

*This report
has been
reviewed
and
approved*

Near the conclusion of the narrative, an Aerospace Research Pilot Course is introduced into the USAF Experimental Flight Test Pilot School. Following that comes redesignation of the school to the USAF Aerospace Research Pilot School.

Appended to the narrative to make this effort as complete as possible are a roster of the commandant and staff by year, a list of graduates by class and date graduated, and biographical sketches of the commandants from 1951 through 12 October 1961 current curriculum.

Production of this document was accomplished with the support of the Director of Information, Lieutenant Colonel David B. O'Hara, who loaned A2C Chester R. Hires to the Historical Division to assist with the research and the writing. The cooperation extended to the Historical Division by Mrs. Della N. Chase, Secretary to the Commandant, USAF Aerospace Research Pilot School, and Second Lieutenant James E. Knight, Administrative Officer, USAF Aerospace Research Pilot School, is acknowledged also.


IRVING L. BRANCH
Brigadier General, USAF
Commander



SCHOOL EMBLEM

Approved 3 July 1956 by 3rd Ind, DAF to Comdr ARDC, AFPMP-12-C-3 to letter, USAF Experimental Flight Test Pilot School, FTT, to Director of Military Personnel, Hqs USAF, Subj: Proposed Emblem for the USAF Flight Test School.

SCHOOL EMBLEM: A shield azure, fimbriated argent, edged gules; a silhouetted futuristic supersonic aircraft of the second, in bend, fire exhaust proper; the aircraft's nose between two sound-barrier symbols or, a slide rule proper (detail white, outlines of the first), surmounting the aircraft in bend sinister.

MOTTO: SCIENTIA EST VIRTUS — Knowledge Is Power.

SIGNIFICANCE: Our emblem depicts the contribution of our School toward national defense. The shield background por-

trays the defensive aspect; further, it was chosen to remain similar to the Air Force Flight Test Center emblem, and thus support it since the School is located at the base of the Flight Test Center. The slide rule crossing a futuristic supersonic aircraft indicates that the pilots are being taught to evaluate all new and future aircraft. The slide rule is chosen as the mechanism for portraying evaluation because of its computational (and hence evaluative) role in the analysis of new aircraft, and because it is an instrument commonly used for this function. Our emblem reflects the School's mission of imbuing its students with knowledge and skills to evaluate new aircraft thus contributing to the power of the Air Force. The oblique shockwaves emanating from the aircraft indicate the look to the future since they definitely establish the aircraft as supersonic. Red, white, and blue are our National colors.



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CHRONOLOGY

19 Apr 1949

Colonel Albert Boyd, Chief, Flight Test Division, AMC, Wright-Patterson AFB, recommends the AMC Flight Performance School be moved from Wright-Patterson AFB, to Muroc, AFB.

7 Sep

Colonel Albert Boyd assumes command of Muroc AFB.

8 Dec

Muroc AFB is redesignated Edwards AFB by USAF message AFPMP-12-C9913 in honor of Captain Glen W. Edwards, Lincoln, California who was killed 5 June 1948 while on a test flight of the YB-49 Flying Wing.

4 Feb 1951

AMC Experimental Test Pilot School is moved from Wright-Patterson AFB to Edwards AFB.

2 Apr

Air Research and Development Command becomes operational as an independent organization.

25 Jun

Air Force Flight Test Center at Edwards AFB is activated by the Air Research and Development Command.

1 Sep 1952

The 6512th Test Pilot Training Squadron (Experimental) is activated at Edwards AFB to administer and report personnel assigned to the ARDC Experimental Flight Test Pilot School.

24 Nov

ARDCR 53-1 is published by Air Research and Development Command to outline the ARDC Test Pilot School mission, responsibilities, applicant eligibility, and enrollment procedures.

1 Jan 1953

The ARDC Experimental Flight Test Pilot School is redesignated the USAF Experimental Flight Test Pilot School.

15 Apr

Major John R. Amann, Commandant of the USAF Experimental Flight Test Pilot School, is promoted to Lieutenant Colonel.

1 Sep 1954

The 6512th Test Pilot Training Squadron (Experimental) is redesignated the 6512th School Squadron (Test Pilot).

14 Mar 1956

The Academic Section of the USAF Experimental Flight Test Pilot School moves into its new \$156,000 school building at the Main Base.

16 Apr

USAF Experimental Flight Test Pilot School Maintenance Section occupies its re-located hangar on the new Main Base.

25 May

Lieutenant Colonel Herbert V. Leonhardt is named to succeed Lieutenant Colonel John R. Amann as Commandant of the USAF Experimental Flight Test Pilot School.

5 Dec

ARDC Supplement #1 to AFR 53-19 delegates to the AFFTC Commander responsibility for operation of the USAF Experimental Flight Test Pilot School.

24 April 1959

Lieutenant Colonel Herbert V. Leonhardt, Commandant of the USAF Experimental Flight Test Pilot School, is promoted to colonel.

29 Jun

Major Richard C. Lathrop succeeds Colonel Herbert V. Leonardt as Commandant of the USAF Experimental Flight Test Pilot School.

2 May 1960

U. S. Army Helicopter Test Pilot Course begins at the USAF Experimental Flight Test Pilot School as Class #60-B.

16 Dec

Seven U. S. Army Pilots graduate as Class 60-B, USAF Experimental Flight Test Pilot School Helicopter Test Pilot Course.

15 Jan 1961

USAF Experimental Flight Test Pilot School loses its Aircraft Maintenance Branch, Supply Branch, and Technical Inspection Office to the 6515th Maintenance Group.

1 Mar

The 6512th School Squadron (Test Pilot) is discontinued and USAF Experimental Flight Test Pilot School personnel become assigned to Headquarters Squadron Section, AFFTC.

5 Jun

Class #1, Aerospace Research Pilot Course, begins at the USAF Experimental Flight Test Pilot School.

17 Jun 1961

Lieutenant Colonel Robert M. Howe succeeds Major Richard C. Lathrop as Commandant of the USAF Experimental Flight Test Pilot School.

12 Oct

The USAF Experimental Flight Test Pilot School is redesignated the USAF Aerospace Research Pilot School.



PHOTOGRAPHS



Major John R. Amann, Commandant of the USAF Experimental Flight Test Pilot School 1 May 1951-25 May 1956.

By April 1953 when this picture was made, Maj Amann and his staff had developed a professional curriculum which was fulfilling the USAF Test Pilot School mission. Problems yet to be solved at this early date included suitable late model aircraft, selection of qualified applicants, and the assignment of graduates.

Capt Everest C. Riccioni, Stability and Control instructor, Maj Amann, Commandant, and Capt Harold J. Eberle, Stability and Control instructor in April 1953 outside the USAF Test Pilot School which was located in an old World War II wooden hangar on the South Base.





Captain Everest C. Riccioni conducting a Stability and Control Class.

Student entering the Lockheed F-80 "Shooting Star" first of the jets assigned to the school.

F-80's were assigned from 1951 to 1955, but gave way to F-84's and F-86's. Other school aircraft during that era included B-25's, T-28's, and T-33's.





The flight line in 1955 was a beehive of activity as hangars were moved from the old South Base to the new Main Base area. One of the hangars became the maintenance hangar for school aircraft.

Performance instructor, Captain Robert H. Jacobson, standing beside his student Captain Alvin G. Moore, checking data following a performance flight.





Lt Col Herbert V. Leonhardt, Commandant, USAF Experimental Flight Test Pilot School, 25 May 1956-29 June 1959.

Col Leonhardt was a graduate of Class 55-C. He possessed a Bachelor of Science degree in aeronautical engineering from Virginia, Polytechnic, and a Master of Science degree in aeronautical engineering from Princeton University.

Pilot's Lounge, USAF Experimental Flight Test School

Cpts Ralph S. Matsen, Alvin G. Moore, Willum H. Spillers Jr., Floyd B. Brown Jr., Harold Eberle, Harold K. Wimberley, and Edwin G. Chaplin taking a coffee break between classes in the Pilot's Lounge of the new USAF Experimental Flight Test Pilot School.





Capt Alvin G. Moore, a student, stands before the personnel, equipment, and aircraft utilized to graduate a test pilot.

Using a recordak to study in-flight data obtained by a student on an instructional flight are Captains Edwin G. Chaplin, Ralph S. Matsen, William E. Haynes (standing), John K. Campbell, and Alvin G. Moore.





Squadron Leader William J. O. Morrison, Lieutenant Commander Robert M. Crosley, Wing Commander Ian M. M. MacDonald, Group Captain Richard E. Burns, Mr. James A. Long, and Squadron Leader Peter P. Baker of the Empire Test Pilot School on visit to the USAF Experimental Flight Test Pilot School 11 — 18 December 1957. All were members of the faculty, Empire Test Pilot School, Farnborough Air Station, England. The faculty and students of the USAF Experimental Flight Test Pilot School make annual pilgrimages to the Empire Test Pilot School, the French Flight Test Center and Flight Test School, Bretigny, and the Italian Flight Test Center, Pratica di Mare, Rome. These trips are made to acquaint a percentage of school students with testing procedures and facilities of the other test pilot schools in the world.



Major Richard C. Lathrop, Commandant, USAF Experimental Flight Test Pilot School 29 June 1959-17 June 1961.

Major Lathrop graduated from the school in April 1956 with Class 55-D. He also was a graduate of the University of Wisconsin where he received a Bachelor of Science degree, Master of Science degree, and his Doctorate of Philosophy.



Lt Col Robert M. Howe, Commandant, USAF Experimental Flight Test Pilot School 17 June 1961-12 October 1961.

Lt Col Howe completed the AMC Flight Performance Course in March 1950 and the ARDC Experimental Test Pilot School's Stability Course in Sept 1952. He obtained a degree in electrical engineering from Norwich University in 1941.



First Aerospace Test Pilot Students, Maj Thomas U. McElmurry, Maj Robert S. Buchanan, Capt James A. McDivitt, and Mr. William G. Schweikhard ponder one of the many problems encountered as students of the first class, Aerospace Research Pilot Course.

Capt James A. McDivitt, a graduate of Class 59-C and Class #1, USAF Aerospace Research Pilot Course.

Capt McDivitt who was assigned to the AFFTC Flight Test Operations Division after graduation from the USAF Experimental Flight Test Pilot School in April 1960 and the Aerospace Research Pilot School in 1961 was picked as an astronaut by NASA in 1962.





HISTORY OF THE USAF EXPERIMENTAL FLIGHT TEST PILOT SCHOOL

genesis

The technical revolution which followed World War II was responsible in many ways for the establishment of the USAF Experimental Flight Test Pilot School. Test pilot training came into its own with arrival of the atomic age and the appearance of Russian-built, Russian-engineered MIG's in Korean skies. For it was at this time that the United States Air Staff recognized an urgent need for air technological supremacy.

As it became apparent that United States air technological supremacy had to be achieved and maintained for the Nation to survive the Air Research and Development Command (ARDC) on 2 April 1951 became operational as an independent organization, and air research and development Centers were established throughout the United States. One of these test sites, the Air Force Flight Test Center (AFFTC), was activated on 25 June 1951 and charged with accomplishing flight test of aircraft, their power plants, and their components. Tremendous advances followed in aircraft performance. Speeds in excess of 1,650 miles per hour and altitudes of over 90,000 feet soon were attained. While these achievements were advancing aviation, the aircraft that were making them were becoming progressively more complex for their pilots. It was this complexity that created a need for a new type of test pilot - the test pilot-engineer. For it had been determined that along with unusual flying ability, a strong engineering background was required to test fly advanced design aircraft.

Since the test pilot-engineer was extremely rare in the United States Air Force, it was the purpose of the USAF Experimental Flight Test Pilot School to produce pilots who were a match for the aircraft they would fly - pilots adept at engineering as well as flight test techniques. Although most colleges offering aeronautical engineering courses taught aircraft performance, stability, and control, such schools rarely included up-to-date methods of flight testing. It was the goal of the USAF Experimental Flight Test Pilot School to overcome this shortcoming by teaching up-to-date methods of determining flight characteristics, performance, stability, and functional utility of aircraft. In addition, the art of obtaining information on serviceability of aircraft installed equipment and component parts was taught. The curriculum then was designed to satisfy USAF requirements for qualified pilot-engineers.

The USAF Experimental Flight Test Pilot School now at Edwards AFB is housed in a modern building completed in 1956 at a cost of \$152,000.^{1*} The school developed from the USAF Air Materiel Command Flight Performance School which had been established at Wright-Patterson AFB, Ohio, in the mid-1940's. However, a test pilot training activity utilizing T-6 aircraft had been organized at that base as early as 1943. At the time the test pilot school was first located at Wright-Patterson AFB it had only one T-6 aircraft. Later a more formal school for test pilot training was established at

* See Bibliography

Vandalia Municipal Airport, Ohio. School aircraft had increased to 32 by 1945 and included T-6's, P-51's, and B-17's. Primary school work of test pilot students at that time mostly involved flying the school aircraft to obtain performance data and to evaluate aircraft handling characteristics.

In 1945 the school was moved back to Wright-Patterson AFB and in 1946 the school was expanded by addition of an aircraft stability course to that of performance. By 1947 the school was identified as the USAF/AMC Flight Performance School. Some of the officers associated with that school in its early days included the Air Materiel Command Commander, Lieutenant General Benjamin W. Chidlaw, Colonel Albert Boyd who was Chief of the Flight Test Division at Air Materiel Command, and Colonel Franklin K. Paul, Chief of the Flight Performance School.

move of the test pilot school to Edwards AFB

Colonel Boyd who had become a staunch supporter of aviation during his military career became the first booster to move the school away from the congested Wright-Patterson Air Force Base area. As Chief of the Flight Test Division in Headquarters Air Materiel Command, Colonel Boyd on 19 April 1949 recommended to the Air Materiel Command Director of Research and Development that the school be moved from Wright-Patterson to Muroc Air Force Base (later Edwards Air Force Base).²

The advantages of the Edwards Air Force Base, California, location as pointed out by Colonel Boyd were too numerous to mention here. But isolation, good air control, inclusion of Rogers Dry Lake - a natural landing field, excellent weather, and master planning underway at the time all weighed heavily in favor of moving the school west. All of these favorable factors and much more were pointed out by a staff study published in April 1949 for movement of the Air Materiel Com-

mand Flight Performance School to Muroc Air Force Base.³ Also about this time, the Flight Performance School was renamed the Air Materiel Command Experimental Test Pilot School.

Muroc Air Force Base came under jurisdiction of the Air Materiel Command and on 7 September 1949 Colonel Boyd assumed command of Muroc. Boyd lost no time in his attempts to move the test pilot school from Wright-Patterson Air Force Base. He shot a request back to the Air Materiel Command Commander asking that Captain John R. Amann be sent to Muroc to prepare facility requirements in connection with the possible transfer of the Air Materiel Command Experimental Flight Test Pilot School.⁴

General Chidlaw acquiesced and during the next year Captain Amann gathered information and prepared data on school funding, personnel, and material requirements. Finally on 4 February 1951 under the supervision of Captain Amann, school funds, personnel, material, and aircraft moved to Edwards AFB* and the school became established in a large maintenance hangar on the old South Base. Transfer of the school to Edwards included 468 funds for 28 ungraded civilians, and 691 funds for four graded civilians. An additional 15 civilian allotments were provided by the Comptroller, Edwards AFB, for a total of 47 civilian allotments for the school.

There now followed somewhat of a hassle as to just how the school would be assigned at Edwards. Colonel Franklin K. Paul who had replaced Colonel Boyd as Chief of the AMC Flight Test Division advised Boyd on 9 February 1951 of how General Chidlaw wanted the school to function at Edwards AFB.⁵ Although Colonel Boyd received Colonel Paul's letter, he informed the AMC Organization and Manning Division that the school would be established at wing level under the technical surveillance of the Director, Experimental Flight Test and Engineering. However, the issue was resolved quickly by the AMC Commander when he directed the school

* Muroc AFB was redesignated Edwards AFB by USAF msg AFPMP-12-C9913, 8 Dec 1949.

be organized as a section within the Directorate of Flight Test and Engineering.

Captain Amann as the School Commandant set out immediately to get the test pilot school off the ground. His main concern was two major problem areas - test pilot requirements in numbers and aircraft types for the school - the latter somewhat compounded by introduction of jets into the Air Force inventory.

In the meantime, jurisdiction of Edwards AFB passed from the Air Materiel Command to the Air Research and Development Command on 2 April 1951 and the Air Force Flight Test Center was established and assigned to ARDC on 25 June 1951.⁶ The AMC Experimental Flight Test Pilot School during that reorganization remained under the Directorate of Flight Test and Development as a Branch, but responsibility for its operation was retained by the ARDC Commander. Not long thereafter the school became known as the ARDC Experimental Flight Test Pilot School.

test pilot requirements established

During 1951 the school enjoyed an enrollment of better than 30 students and graduated 10 test pilots. But there was no ready-made way of determining at the time if this input and output were sufficient for Air Force needs. Captain Amann as Commandant of the school set out to rectify this deficiency by establishing Air Force Flight Test Center and Wright Air Development Center test pilot requirements. Before he finished he had delved into Air Force-wide test pilot needs.

One factor was quite clear since flight test now had become a basic element of the ARDC mission - practically all aircraft flight test was delegated to the Wright Air Development Center (WADC) and to the AFFTC in direct

support of the ARDC mission.⁷ Flight test at the AFFTC was primarily that of Phase II, IV, and VI as defined in AFR 80-14 while WADC performed Phase V testing in addition to flight test in direct support of the WADC aircraft development laboratory. Phase testing varied from rather simple to extremely complex evaluations and required numbers of experienced test pilots accordingly. Besides all this, the Air Force began assigning two test pilots with aircraft contractors for some participation during contractor Phase I tests of new aircraft. Due to the success experienced in the AF/contractor evaluation of new aircraft, both Colonel Boyd and Captain Amann felt that Air Force test pilot assignments to contractor Phase I testing would increase.

Air Force test pilot requirements in other commands were not known in mid-1952, but there were indications that a few commands were beginning to realize a need for this new breed of pilot. Jet aircraft were coming into prominence which required greater piloting skill, and test pilots were needed to design and supervise new aircraft test programs in unusual geographic locations in relation to humidity, altitude, temperature, and runway conditions.

It was rather difficult to relate school production of test pilots to Air Force-wide test pilot requirements, but relating the school to ARDC requirements produced some interesting facts in July 1952. The school commandant determined that the flight test workload at the AFFTC alone required 40 fully qualified test pilots but only 19 test pilots were assigned. The WADC situation was slightly better, for 40 test pilots were assigned to meet a WADC workload which required 40. However, 13 of the 40 had been assigned to flight test duty sufficiently long to justify a change to other assignments for sound career development. Moreover, other Centers within ARDC could use an additional 10 experienced test pilots to design and supervise aircraft test programs. In all, ARDC required approximately 90 test pilots but had

only 59 assigned. Of the 59 assigned, three lieutenant colonels were above the grade authorized by the AFSC and 13 were eligible for reassignment. Obviously this boosted the ARDC test pilot shortage to 47. In addition, about 25 test pilots per year would have to be trained as normal replacements to put the test pilot replacement flow on an equal basis. Consequently the ARDC test pilot shortage was near 70.

Test pilot classes began every four months in 1953 with approximately 10 students per class due to the limited school staff and the small number of aircraft assigned to the school. That shortcoming permitted a meager enrollment of 20 students in any one period. Furthermore, the sources from which students had been obtained in the past now were drying up, and it was becoming clear to the school staff that unless additional personnel and logistical support could be obtained for the school the acute test pilot shortage in ARDC would only become worse.

first reorganization of the test pilot school

In April 1952 the School Commandant and the Assistant for Personnel Plans at Headquarters ARDC began a study which would culminate in recommendations for reorganization of the test pilot school. Their study reviewed the various problems connected with providing sufficient qualified experimental test pilots in the quantity required for flight testing aircraft, and was presented to the ARDC Deputy for Operations and the Deputy for Personnel on 18 July 1952.⁸

Briefly stated the more salient points of the study were concentrated in the following recommendations:

Establish a test pilot training squadron as a Table of Distribution organization attached to the AFFTC and located at Edwards AFB.

Select pilot students on an Air Force-wide basis.

Initiate a build-up of personnel, students, and aircraft for the new experimental test pilot squadron.

Graduates of the proposed experimental flight test pilot squadron would be assigned to meet ARDC requirements during the next 12 months. After that, consideration should be given to meeting Air Force-wide test pilot needs.

In consequence of the work of Major Amann and Major Hamilton of ARDC, General Earle E. Partridge then in command of ARDC designated and activated the 6512th Test Pilot Training Squadron (Experimental) on 1 September 1952 at Edwards AFB.⁹ By that action the school gained some semblance of autonomy, for it was no longer a branch of the Directorate of Flight Test and Development. With activation of the 6512th Test Pilot Squadron (Experimental), ARDC Test Pilot School personnel and administration fell to the school commandant.

General Partridge in November 1952 followed up on activation of the school squadron by definitizing the school mission, scope of training, responsibilities, schedule, eligibility requirements, application methods, and procedures for enrollment at the ARDC Experimental Test Pilot School.¹⁰ He defined the school mission as follows:

To provide a course of instruction to train selected pilots to conduct flight test on experimental and production-type aircraft, to determine flight characteristics, performance, stability and functional utility, and to obtain technical information on serviceability and functioning of installed equipment and component parts.

Scope of instruction included academic study in aerodynamics and related aeronautical engineering subjects, practical test flying in aircraft of known flight characteristics, use of techniques required in testing experimental aircraft, reduction of data obtained in the fields of performance, stability and control, and writing final reports identical to the type required in performing test pilot duties.¹¹

General Partridge pointed out that experimental test pilot training was now his responsibility as Commanding General, Air Research and Development Command, and that such training would be carried out at the highest level of professionalism necessary to maintain an Air Force capability for experimental flight testing. The General emphasized further that all such test pilot training would be conducted at the ARDC Experimental Test Pilot School located at Edwards AFB.

school aircraft

When the test pilot school moved from Wright-Patterson AFB to Edwards AFB, the prime and most immediate change made was that in assigned aircraft. The introduction of jet aircraft into the Air Force inventory had begun and that created a need for jet test pilots. The first jet added to the school was the reliable F-80 "Shooting Star." It undoubtedly would have been advantageous to obtain other types of jet aircraft for school instruction. But Major Amann opined that a mixture of jet types would complicate maintenance to the extent that the disadvantages would far outweigh any advantages. Furthermore, in 1951 it was not yet essential to conduct the major portion of pilot training in jet aircraft.

Besides addition of F-80 jets to the school, T-6 aircraft used at Wright-Patterson AFB were replaced by modern T-28 trainers and more reliable B-25's. T-28's and B-25's were chosen over other aircraft because of

their stability and the minimum amount of maintenance required to keep them in commission. However, the school aircraft problem was not fully solved by receipt of an aircraft and the installation of instrumentation, for that aircraft had to be kept in-commission.

Operation of the Test Pilot School by mid-1951 convinced Major Amann that replacement aircraft for those out of commission would be another problem of considerable magnitude. Amann discussed the up-and-coming dilemma with the Director of Flight Test, Colonel Fred J. Ascani, on 30 July 1951, noting that an F-80 which had been damaged on 22 June was not expected to be in-commission until March 1952. The latter date was premised upon a reply received from ARDC regarding availability of a wing assembly and Major Amann believed that if this were to be the rule rather than the exception, then a more accelerated maintenance plan was needed or the school's mission would fail for lack of operational aircraft.

Colonel Ascani carried the aircraft problem to ARDC pointing out that the school possessed only 10 aircraft¹² - four B-25's, two B-26's, two T-28's and two F-80's - and a high out of commission for maintenance rate would be disastrous to the school mission. During December 1951, the ARDC Commander sent Major Robert F. Fackler to Edwards AFB for a look at school aircraft needs. Seemingly as a result of Major Fackler's review, three T-28's and two F-80's were added to the school in early 1952. Concurrently B-26's were phased out.

In 1953 the school aircraft picture brightened somewhat with addition of two B-25's, two T-33's, and four F-84's. Also the school began phasing out F-80's. The latter were dropped entirely in 1954 after the fourth and last F-84 arrived.

During the interim, Major Amann turned his attention to replacement aircraft for the antiquated B-25's. He

considered either the T-29 or C-131 as a likely candidate, but ARDC did not authorize replacement action during the remainder of 1953. Amann tried again in July 1954 to obtain late model aircraft for the old B-25's still in use. In correspondence with ARDC he proposed a series of solutions in an attempt to interest that headquarters in his problem. One suggestion was to provide six TB-57's. Another was to assign four TB-57's and two B-57B's. And still another was to give the school four TB-57's and two B-57A's. When ARDC had accepted none of the requests by late 1954, Major Amann and the AFFTC Commander, Colonel J. S. Holtoner, requested as an interim measure two T-33's and three F-86's. These aircraft were provided for school use in 1955.¹³

Receipt of F-86's alleviated somewhat a difficult problem area that had existed since introduction of supersonic high altitude aircraft testing at the Air Force Flight Test Center in late 1953. But unless supersonic aircraft were obtained in quantity for the school, Lieutenant Colonel Amann knew he would be unable to provide the Air Force with fully qualified test pilots.

Late model aircraft in sufficient numbers for school needs still were lacking in 1955. Amann approached General Holtoner in August 1955 detailing his requirements for modern airplanes.¹⁴ Amann emphasized that his aircraft were archaic - condemned for test pilot work on the basis of age - were difficult to maintain, and were structurally inadequate due to the rigors imposed during stability flying. His solution to the problem was assignment of B-57C or C-131 aircraft to the school. Armed with this information, General Holtoner called upon the ARDC Commander, Lieutenant General Thomas S. Power, explaining the situation then existing in order that ARDC might make a demanding presentation of the problem to the Air Staff at Headquarters USAF.¹⁵

Colonel Amann was informed later that replacement aircraft of the type re-

quested were not available and it was probable that such aircraft would not become available in the near future. In his reply, General Power indicated that T-29's appeared to be the only aircraft obtainable for school use and they would become available in lieu of B-57's. Nothing ever developed concerning T-29 aircraft, however, and Colonel Amann determined in December 1955 that the best he could do for the school aircraft-wise was the YC-131C available possibly in September 1956. Yet he refused YC-131's because of their poor in-commission record and the fact they were turbo-prop instead of jets.

Prior to Lieutenant Colonel Amann's relief as Commandant in May 1956 he was notified by Headquarters USAF that RB-45's could be obtained for the school if he desired their use. But Amann refused these interim aircraft due to their rarity in the Air Force inventory.

By now, experience revealed school aircraft requirements to center in two distinct areas - work horse and refinement. The first truly refined aircraft was the F-100C assigned to the school in 1956, and the aircraft problem eased considerably early in 1957 with assignment of four B-57's.

But the problem of acquiring more useful aircraft for the school would never completely resolve itself. New developments in air technology would continually relegate school aircraft to obsolescence. Therefore, school authorities accustomed themselves to the fact that the aircraft problem was with them to stay. Lieutenant Colonel Herbert V. Leonhardt who replaced Lieutenant Colonel Amann in 1956 took up the battle for more and better late model aircraft. But he also experienced an exceedingly difficult time in obtaining Century series aircraft for the school. He repeatedly requested F-102's and F-104's to update school aircraft, but in his three years as Commandant he had but one Century series aircraft assigned - an F-102.

curriculum

By 1952, subjects taught at the school included algebra, trigonometry, physics, calculus, calculator operations, applied mechanics, thermodynamics, Kinetic theory of gases, properties of the atmosphere, conventional engine performance, jet engine performance, aircraft performance, weight and balance, supersonic aerodynamics, longitudinal and lateral directional stability, stability test methods, and report writing. Moreover, a few students were also introduced to British flight test methods.¹⁶

That large amount of classroom work was balanced by better than 30 hours of performance evaluation in T-28's and F-80's and from 35 to 40 hours flying time in B-25's to complete stability problems. A school instructor accompanied the student during all flights except those flights in the single-seat F-80. A typical flight plan would include long hours at high altitudes, vertical stalls, spins, steep rate-of-climb, normal take-offs, performance take-offs, nose-up attitude landings, and minimum distance landings.

Long before sunrise each day USAF Experimental Flight Test Pilot School operations were underway. As observed by Major Amann, the air at the AFFTC was still cool during early morning hours and that was ideal for test flying. Most mornings were spent on various types of flights or viewing film taken of instruments on previous flights. Afternoon activities usually consisted of lectures on the academic portion of training.

Instruction at the school was served up to the student in three phases. A refresher course was offered to prepare them for the engineering work ahead. This course covered algebra; trigonometry, calculus, graphical and analytical interpretations of the differential; physics to include mechanics and dynamics of bodies; aerodynamics general, applied aerodynamics, and performance, stability and control applications.

A second phase of instruction involved theory and practice of performance flight test. The performance phase covered, calibration test - airspeed, altimeter, free air temperature, level flight - power required, speed points, range determination, and climb tests - sawtooth climbs, check climbs, and cooling saws.

The final phase of instruction covered the theory and practice of stability and control flight testing. That phase included longitudinal tests - stalls, static dynamics, accelerated, trim changes, landing investigations, and lateral directional tests - static, dynamic, asymmetric power, aileron roll, and adverse yaw.

A student was introduced to the aircraft performance course first and upon completion of the performance phase he immediately entered the stability and control course. Each student flew his own tests, reduced the data gathered on the flight, and analyzed the results. The student then submitted a report of all data, his analysis, and his observation of results.

Students received other instruction in addition to classroom work and flying. Class 51-A was furnished a tour of the Northrop Aviation Corporation factory on 9 July 1951. Northrop representatives presented a series of lectures during the morning and then toured the students through the complete construction sequence of the F-89 program. Information received on that visit was considered so valuable that Major Amann incorporated into the school curriculum like visits to other contractor facilities.

Also each class was treated with a trip to Williams AFB, Arizona, to check-out in an ejection seat on a special stand and a bout with the high altitude pressure chamber. The Williams AFB trip was a mandatory portion of the training program. Failure to withstand either the ejection seat experience or the high altitude chamber resulted in automatic disqualification for test pilot training.

A new daily schedule was implemented with Class 52-B on 28 January 1952

whereby instruction in the morning was devoted to flying and data reduction and the afternoon was taken up with four 50-minute lectures. Seemingly that was an experiment in scheduling to develop an optimum. It apparently pleased Major Amann for it was adopted and used during the remainder of his tenure as Commandant.

Graduation of Class 51-C in May 1952 marked the end of the first year for the school. During that year, USAF, Royal Canadian Air Force, civilian aircraft contractor, and Civil Aeronautics Administration personnel had attended the school. Largely through the efforts of Major Amann and his faculty the school now could boast a complete and well-rounded course.

In 1955 the \$120,000,000 new Main Base was nearing completion on the west shore of Rogers Dry Lake and one of the facilities would be a new USAF Experimental Flight Test Pilot School. The School's new building was under-way in March 1955 with grading of the area and laying of utility lines. Estimated date of completion was September 1955, but the contractor hit bedrock near the surface during May and June which delayed construction of the building. Construction continued to lag, and it was not until the next year that the building was finished.

While construction on the new building for the school was underway, a huge hangar on the old South Base was moved to the new Main Base complex and near where the new school building was going up. Its purpose was to house the school aircraft maintenance facility. The academic section moved into its new facilities on 14 March 1956 and school maintenance occupied its re-located hangar on 16 April 1956.

On 25 May 1956, Lieutenant Colonel Herbert V. Leonhardt, a graduate of Class 55-C, was chosen by General Holtoner to succeed Lieutenant Colonel Amann as USAF Experimental Flight Test Pilot School Commandant.¹⁷ As noted previously, Leonhardt prepared

to pursue the tactics of Colonel Amann in his crusade for more and better aircraft, facilities, and student selection and assignment procedures. However, the task became somewhat easier on 5 December 1956 when the ARDC Commander, General Thomas S. Power, delegated responsibility for operation of the school to the AFFTC Commander.¹⁸

The curriculum remained unchanged from the graduation of Class 51-C in May 1952 until 1958. When Class 58-C matriculated on 25 August 1958, Colonel Leonhardt had received permission from Headquarters USAF to alter the curriculum to keep pace with Air Force advanced weapon systems. Leonhardt lengthened the course from 24 weeks to 32 weeks and established three classes per year (to begin in January, May, and August) instead of the previous four. Students per class remained at 16, and such subjects as engine performance, turbo-prop, and the human factors portion of space technology were added to the Performance Phase. The Stability and Control Phase was augmented by addition of study relative to high Mach number effects on longitudinal and directional control and lateral stability derivatives. Each Phase was 16 weeks duration.¹⁹ Colonel Leonhardt reasoned that these changes would graduate a more professional test pilot, for the extended course now was equivalent to the last two years of a college engineering course.*

Lieutenant Colonel Leonhardt was promoted to Colonel on 24 April 1959 and was picked in early July for attendance at the Air War College. Major Richard C. Lathrop who had been associated with the school since October 1955 when he was a student succeeded Colonel Leonhardt as Commandant on 29 June 1959.²⁰ Major Lathrop graduated with Class 55-D.

test pilot school applicant eligibility

When General Earle E. Partridge definitized the school mission in November 1952, he outlined applicant eligibility for attendance at the ARDC

See Appendix D, Part I.

Experimental Flight Test Pilot School.²¹ Eligibility requirements for enrollment were explicit and stringent. Applicants had to be regular or reserve officers on extended active duty. Reserve officers, moreover, were required to certify that they would remain on extended active duty for at least three years from their date of graduation. Prospective students according to General Partridge had to be on flying status as a pilot with a current aeronautical rating, have a minimum of 1500 hours of diversified flying, be between 25 and 30 years of age at the time of application, and hold the equivalent of a bachelor of science degree. However, special consideration would be given those pilots with vast jet or helicopter experience.

Applications for the school provided the date applicant would be available for assignment to the school and evidence that he was not accident prone. Included also was an evaluation or assessment of the officers piloting skill and experience, ability to analyze problems, and the indorsing officers reaction to having the applicant after further training make important decisions concerning flying qualities and tactical suitability of future Air Force aircraft.

Students applying for the school were not limited to the Air Force. Other government agency members, civilian contractor pilots, and officers of friendly nations could attend the school on a space available basis. Initial selection of officer students to attend the test pilot school was vested in the Air Force Flight Test Center Commander, but final selection for student assignment to the school was retained by the ARDC Commander.

The ARDC Experimental Flight Test Pilot School was functioning Air Force-wide by December 1952. Consequently, it was redesignated on 1 January 1953 as the USAF Experimental Flight Test Pilot School.²² The ARDC Commander retained responsibility for operation of the school, but the USAF outlined policy and general procedures for the school.²³ Eligibility requirements for attendance

remained essentially the same as those established by the ARDC Commander in November 1952 with the exception that USAF would make final selection of applicants.

Major Amann was promoted to Lieutenant Colonel on 15 April 1953²⁴ and departed the AFFTC five days later for Headquarters ARDC to resolve problems concerning operation of the school under USAF. One of the issues settled was the means of transmitting student applications between the AFFTC and USAF. Amann was advised to forward prospective applications direct to USAF School Branch, Director of Personnel, Headquarters USAF, rather than through ARDC as in the past. In addition, under new policies established by USAF, applicant foreign service selection date, combat experience, and direct duty assignment was to be considered before selection for test pilot training. In no case were non-combat experienced officers to be selected to attend the test pilot school.

Not all of the student enrollment procedure established by USAF met with Colonel Amann's approval. He contended that the academic requirements were vague as set forth by USAF and it was his experience as Commandant of the school that numerous applicants had been admitted as students who were not adequately prepared to cope with the course. He cited the fact that several students were dropped in 1952 and 1953 due to academic deficiencies.

On 26 October 1953, Colonel Amann's objections were dispatched to the ARDC Commander accompanied by a request for two changes in USAF student enrollment procedure.²⁵ He asked that the age limit of applicants be raised to 33 years and all applications be accompanied by a college transcript as a supporting document.

test pilot school graduate assignments

By mid-1954 USAF Experimental Flight Test Pilot School graduate

assignments had become another major problem. After considerable correspondence between the AFFTC and ARDC Commanders, a conference was convened on 16 August 1954 in Baltimore with Lieutenant Colonel Amann and Colonel Marion J. Akers the AFFTC Chief of Staff representing the school. It was apparent from the start of the conference that the core of the entire problem was assignment of test pilot school graduates to ARDC units when they had been accepted from units Air Force-wide (monopolizing graduates), and the assignment of test pilots to duties not covered by their Air Force Specialty Code (AFSC).

After a two-day hassle the conferees settled upon the following recommendations among others in presenting the problem to USAF:

Change AFR 53-19 to state that no AFSC would be assigned to test pilots upon graduation, and permit ARDC authority only to make special assignments in the research and development field. The latter action would pave the way for graduates other than those given a special assignment in ARDC to be utilized Air Force-wide.

Not too much ever came as a result of the conference recommendations. However, Major Amann was notified on 1 September 1954 that the 6512th Test Pilot Training Squadron (Experimental) which had been activated two years previously was now redesignated the 6512th School Squadron (Test Pilot).²⁶ Then on 7 December 1954 Colonel Francis R. Royal of the Officers Assignment Division, Directorate of Military Personnel, USAF, outlined a new assignment policy for graduates of the USAF Experimental Flight Test Pilot School.

Beginning with the first class of Calendar Year 1955 (Class 55-A) graduates were not to be awarded an AFSC, but outstanding graduates of the school would be assigned to Air Force Flight

Test Center units to meet existing requirements in AFSC 8744 - Experimental Flight Test Officer. Graduates of the school not considered outstanding in their class would be recommended by the AFFTC Commander for experimental flight test duties elsewhere such as (1) one of the other ARDC Centers where their test pilot training could be utilized, (2) Air Materiel Command aircraft acceptance test pilot duties, (3) Air Proving Ground Command test pilot, or (4) duty pilot within a tactical unit which was receiving the type aircraft he was best qualified to fly. Seemingly, this was a successful solution to the problem of accepting applicants from units Air Force-wide, but assigning graduated test pilots within ARDC.

second reorganization of the test pilot school

By the time Colonel Leonhardt became Commandant in 1956, the school was organized to obtain maximum results from available personnel and facilities in support of the schools primary function - training test pilots. The Commandant now had become directly responsible to the AFFTC Commander for operation and supervision of the school, and the Commandant was also Commander of the 6512th School Squadron (Test Pilot) which had been organized on 1 September 1952 and redesignated on 1 September 1954. This unit gave the School Commandant a tool with which to command, administer, and report his personnel. However, the 6512th School Squadron (Test Pilot) was discontinued on 1 March 1961 and school personnel became assigned to Headquarters Squadron Section of the Air Force Flight Test Center.

Internal organization of the school over the years since its arrival from Wright-Patterson AFB in 1951 changed very little. Below the Commandant was a Training and Operations Branch which implemented training policies through its qualified instructor pilots. Instruction

was centered in two sections, Performance and Stability. A Supply Branch, an Aircraft Maintenance Branch, and a Technical Inspection Office rounded out the school.

Reorganization hit the school for the second time on 15 January 1961 with transfer of its Technical Inspection Office, Aircraft Maintenance Branch, and Supply Branch to the 6515th Maintenance Group in accordance with the base-wide implementation of AFM 66-1.²⁷ Following this reorganization, the school structure under the Commandant became a Training and Operations Branch with its two sections, Performance and Stability, and a Personal Equipment Section.²⁸

Organization of the school was again changed on 5 June 1961 by implementation of an Aerospace Research Pilot Course within the framework of the USAF Experimental Flight Test Pilot School. From that time until 12 October 1961 when the school was redesignated, the school was organized under the Commandant as three divisions - the Aerospace Research Pilot Division, Experimental Flight Test Pilot Division, and a Support Division.²⁹

aerospace research pilot course implemented

By 1961 the USAF Experimental Flight Test Pilot School had existed in one form or another for almost two decades. During this period, through additions and improvements, school capabilities kept current with flight test pilot requirements imposed by Air Force technological advances. There was no respite for the school in 1961. The Air Force break-through with manned aircraft on the fringes of space created a need for aerospace research pilots.

As early as 1960 the school staff as directed by Major Lathrop had been feverishly working up studies pertinent to sources and means of training aero-

space research pilots. On 10 October 1960, the school staff finished a study on a proposed program for the USAF Experimental Flight Test Pilot School covering the years 1960-1965.³⁰ The study was presented to the ARDC Commander (later Air Force Systems Command, AFSC) for review during the week of 17 October 1960. After receiving approval at ARDC the study then went forward to USAF for further review and final approval.

The study indicated that ARDC would require 20 graduates of the school each year through 1965. Air Materiel Command, Tactical Air Command, Air Defense Command, and Strategic Air Command would utilize four graduates each year, with AF contractors or the Federal Aviation Agency using two more per year. In addition to this, at least four foreign students would be enrolled in the school each year, and the US Army would average three students per year in helicopter pilot programs conducted by the school.

According to the study two classes would graduate from the USAF Experimental Flight Test Pilot School each year producing 32 graduates - five less than the anticipated test pilot requirements. By lengthening tours of graduated test pilots, and reassignment of those graduates not being utilized in testing duties, the 32 graduates would be sufficient to meet requirements. Based on this research, the school staff recommended continuation of the present course, but limiting the number of classes to two per year with 16 students in each class.

The school staff in their study noted that award of the Dyna-Soar contract firmly committed the Air Force to the manned spacecraft field. The staff opined that more ambitious manned space research and weapon systems would follow. Highly trained test pilots would be essential for the success of these manned systems. Such a training program could be implemented into the schools curriculum with very little change except in the school name and an

increase in the amount and type of flying training. School officials recommended changing the school name to the USAF Aerospace Research Pilot School to reflect a dual training capability in aircraft testing and manned space vehicle training. Under its new name the school would offer an Experimental Test Pilot Course as at present, and a Space Research Pilot Course. The latter, offered yearly, would begin in June 1961.

The first Aerospace Research Pilot Course began 5 June 1961 as Class Number 1. Although it had USAF approval, the class was an Air Force Systems Command and Air Force Flight Test Center effort designed to establish a course of instruction and provide some degree of instructor competence.

One class per year was programmed for the future and would consist of from six to ten students. Graduates of the Aerospace Research Pilot Course were expected to provide a pool of aerospace trained pilots for participation as necessary in United States spacecraft programs. The first regular class of seven months duration would begin in June 1962³¹ in addition to the long-familiar eight month Experimental Flight Test Pilots' course. However, the latter course starting two or three times annually and graduating 48 students per year would be reduced to 32 graduates annually.

Curriculum for the aerospace research pilot course paralleled somewhat the instruction provided for the Experimental Flight Test Pilot Course. But it was considerably more advanced since the primary mission was to train pilots to perform manned space research programs.³² Students selected to attend this course would be limited to those who had graduated from the experimental test pilot course, the Navy Test Pilot School, or the Empire Test Pilot School in England.

Experimental flight test pilot course graduates were awarded AFSC 1341 for assignment to fill vacancies in AFSC

1344, Experimental Flight Test Officer. Aerospace research pilot course graduates would be awarded AFSC 1344S and assigned as pilots, project officers, or to positions in space development programs or flight test projects.

Expansion of the former USAF Experimental Flight Test Pilot School into the field of training space research pilots was not without its problems. First, a curriculum had to be prepared for the Aerospace Research Pilot Course. Weeks and months of toil were devoted to developing a course which would equip the research pilot graduate to handle spacecraft requirements placed upon him. Under the guidance of Major Richard C. Lathrop, Commandant, the school faculty drew up a program which included such subjects as Newtonian mechanics, fluid mechanics, boundary layer control, high speed aerodynamics, heat transfer, dynamics of rarefied gases, Einstein's theory of relativity, meteorology, astronomy, propulsion, orbital mechanics, trajectories, and bio-astronautics.* Next came the problem associated with acquisition of special training equipment since the course called for the student to be trained in subgravity, reaction controls that permitted maneuvering in space, stability characteristics of space flight profiles, spacecraft boost, orbital re-entry, orbital rendezvous, and ballistic control. To compound the problem, instructors to teach the new advanced course were not available and simulators were either non-existent or not on hand at the AFFTC.

The instructor problem was somewhat alleviated by initiating Class No. 1, Aerospace Research Pilot Course, designed to provide the first students with sufficient training to competently teach future classes. Class No. 1 began on 5 June 1961 with four instructors of the Experimental Flight Test Pilot Course and a test pilot from Flight Test Operations - all graduates of the USAF Experimental Flight Test Pilot School. As planned, at least four of these first students would become Aerospace Pilot Course instructors.

*See Appendix D, Part II.

Lack of special training equipment for the Aerospace Research Pilot Course was not so easily overcome. The best that could be done for the first class beginning on 5 June and the one class of six to eight students per year thereafter until especially configured aircraft and simulators became available was to coordinate with other agencies for rental use of their facilities. Arrangements were completed with the University of Michigan for a short course in flight mechanics of space and re-entry vehicles, the Ames Laboratory of NASA at Moffett Field provided some flight control simulator training, Chance-Vought in Dallas provided use of their space simulator, and the Aeronautical Systems Division demonstrated stress testing techniques and conducted a course in management and instrumentation.³³

Obviously these were only interim measures to take up the slack until more permanent action could be taken. Considerable reliance will be placed in use of the F-104 particularly in the early years of the advanced course. (It had been found during the training of pilots for X-15 flights that an F-104 in a "dirty" configuration - landing from altitude with landing gear extended, speed brakes down, and drag chute out to increase aerodynamic drag - was a close simulation of the X-15 during its unpowered portion of flight.) But it would take at least a year or two before F-104's could be configured to school requirements (rocket engine and ballistic control augmentation). The same was true of F-106 for variable stability and for variable lift/drag.

U.S. Army helicopter test pilot course

A year prior to becoming involved in the training of Aerospace Research Pilots, the USAF Experimental Flight Test Pilot School staff scored another significant first by conducting a special class in helicopter testing and evaluation for the United States Army. That Class (60-B) which began on 2 May 1960 was the first

complete course to qualify pilots for helicopter testing ever offered in the United States military service. However, the Army had long-recognized a need for helicopter test pilots and had called upon the Air Force to perform evaluation of Army helicopters for several years.

For the United States Army Helicopter Pilot Course, the academic portion of the Experimental Test Pilot Course was changed to low speed aircraft and helicopters and actual flying instruction was conducted in the school's instrumented aircraft. Organization of helicopter instruction and training began as early as September 1959 under the guidance of Major Jones P. Seigler who was selected by Major Lathrop as most qualified for that important job because he had been active in helicopter work over an 11 year span. Major Lathrop had replaced Colonel Leonhardt who was picked for attendance at the Air War College and departed on 29 June 1959.³⁴

The Army Helicopter Test Pilot effort of eight pilots graduated as Class 60-B on 16 December 1960 as qualified Army helicopter test pilots. The course was considered such a success that Major Lathrop, the school commandant, appealed to higher authority for permission to retain the helicopter training capability in the school. Major Lathrop held a deep desire to provide instruction for future helicopter pilots of the same quality as that in effect for conventional and jet aircraft pilots and that planned for manned space vehicle pilots.

Major Lathrop was transferred on 17 June 1961 to the Air Force Academy as an instructor. Brigadier General Irving L. Branch as Commander of the AFFTC named Lieutenant Colonel Robert M. Howe to succeed Major Lathrop.³⁵ Lieutenant Colonel Howe continued as commandant of the USAF Experimental Flight Test Pilot School until 12 October 1961 when the school was redesignated the USAF Aerospace Research Pilot School with Lieutenant Colonel Howe as its commandant.³⁶



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APPENDIX A

COMMANDANT AND STAFF

1951

Commandant - Major John R. Amann
 Chief, Training and Operations - Capt Robert B. Allan
 Chief of Performance - 1st Lt Robert D. Hippert
 Performance Instructor - 2nd Lt Daniel R. Wiley
 Chief, Stability and Control - Capt James H. Polve
 Stability and Control Instructor - 1st Lt Everest E. Riccioni

1952

Commandant - Major John R. Amann
 Chief, Training and Operations - Capt Robert B. Allan

Chief of Performance - Capt James H. Polve
 Performance Instructor - 1st Lt Daniel R. Wiley
 Chief of Stability and Control - Capt Robert D. Hippert
 Stability and Control Instructor - 1st Lt Harold J. Eberle
 Stability and Control Instructor - 1st Lt Everest E. Riccioni
 Chief of Aircraft Maintenance - Capt Roscoe Greenhow

1953

Commandant - Lieutenant Colonel John R. Amann

Chief, Training and Operations - Capt
Robert B. Allan
Chief of Performance - Major James H.
Polve
Performance Instructor - 1st Lt Daniel
R. Wiley
Chief of Stability and Control - Capt
Robert D. Hippert
Stability and Control Instructor - Capt
Harold J. Eberle
Stability and Control Instructor - Capt
Everest E. Riccioni
Chief of Aircraft Maintenance - Capt
Roscoe Greenhow

1954

Commandant - Lieutenant Colonel John
R. Amann
Chief, Training and Operations - Capt
Robert B. Allan
Chief of Performance - Major James H.
Polve
Performance Instructor - Capt Daniel
R. Wiley
Chief of Stability and Control - Capt
Robert D. Hippert
Stability and Control Instructor - Capt
Harold J. Eberle
Stability and Control Instructor - Capt
Everest E. Riccioni
Chief of Aircraft Maintenance - Capt
George W. Wegman

1955

Commandant - Lieutenant Colonel John
R. Amann
Chief, Training and Operations - Major
James H. Polve
Chief of Performance - Capt Daniel R.
Wiley
Performance Instructor - Capt Robert
H. Jacobson
Chief of Stability and Control - Capt
Harold J. Eberle
Chief of Aircraft Maintenance - Capt
George W. Wegman

1956

Commandant - Lieutenant Colonel
Herbert V. Leonhardt

Chief, Training and Operations - Major
Richard C. Lathrop
Chief of Performance - Capt Daniel R.
Wiley
Performance Instructor - Capt Robert
H. Jacobson
Performance Instructor - Capt Willum
H. Spillers Jr.
Chief of Stability and Control - Capt
Harold J. Eberle
Stability and Control Instructor - Capt
Ralph S. Matsen
Chief of Aircraft Maintenance - Emil
Zucca

1957

Commandant - Lieutenant Colonel
Herbert V. Leonhardt
Chief, Training and Operations - Major
Richard C. Lathrop
Chief of Performance - Capt Willum H.
Spillers Jr.
Performance Instructor - Capt Robert H.
Jacobson
Performance Instructor - Capt James J.
King
Chief of Stability and Control - Capt
Harold J. Eberle
Stability and Control Instructor - Capt
Robert O. Littell
Stability and Control Instructor - Capt
Ralph S. Matsen
Chief of Aircraft Maintenance - Emil
Zucca

1958

Commandant - Lieutenant Colonel
Herbert V. Leonhardt
Chief, Training and Operations - Major
Richard C. Lathrop
Chief of Performance - Capt Willum H.
Spillers Jr.
Performance Instructor - Capt James
J. King
Chief of Stability and Control - Capt
Ralph S. Matsen
Stability and Control Instructor - Capt
Edward G. Givens Jr.
Chief of Aircraft Maintenance - Emil
Zucca

1959

Commandant - Major Richard C. Lathrop
Chief, Training and Operations - Capt
Willum H. Spillers Jr.
Chief of Performance - Capt James J.
King
Performance Instructor - Capt Philip
E. Neale Jr.
Performance Instructor - Capt Thomas
P. Stafford
Chief of Stability and Control - Capt
Ralph S. Matsen
Stability and Control Instructor - Capt
J. H. Craigie
Stability and Control Instructor - Capt
Edward G. Givens Jr.
Chief of Aircraft Maintenance - Emil
Zucca

1960

Commandant - Major Richard C. Lathrop
Special Assistant to the Commandant -
Major Thomas U. McElmurry
Chief, Training and Operations - Major
Jones P. Seigler
Chief of Performance - Capt James J.
King
Performance Instructor - Capt Philip
E. Neale Jr.
Performance Instructor - Capt Thomas
P. Stafford
Chief of Stability and Control - Capt
John H. Craigie
Stability and Control Instructor - Capt
Edward G. Givens Jr.
Stability and Control Instructor - Capt
John H. Ludwig



APPENDIX B GRADUATES

CLASS 51-A

<u>Name</u>	<u>Rank</u>	<u>Air Force</u>	<u>Date Graduated</u>
Louis W. Baker	Captain	USAF	17 Nov 1951
William T. Campbell	1st Lt	USAF	13 Nov 1951

Instructor (Special) - William G.
Schweikhard
Chief of Aircraft Maintenance - Emil
Zucca

12 October 1961

Commandant - Lieutenant Colonel Robert
M. Howe
Special Assistant for Aerospace Training -
Major Robert S. Buchanan
Chief, Support Division - Capt Philip E.
Neale Jr.
Chief, Aerospace Research Pilot
Division - Major Thomas U. McElmurry
Aerospace Research Pilot Instructor -
Major Arthur Torosian
Aerospace Research Pilot Instructor -
Major Frank Borman
Aerospace Research Pilot Instructor -
William G. Schweikhard
Chief, Experimental Test Pilot Division -
Major Jones P. Seigler
Chief of Performance - Capt Thomas P.
Stafford
Chief of Stability and Control - Capt
John H. Ludwig
Experimental Test Pilot Instructor -
Capt Neil R. Garland
Experimental Test Pilot Instructor -
Capt Francis G. Neubeck

Captain Edward G. Givens Jr. (Returned
14 October from 18 month TDY exchange
duty with the US Navy and was made a
special assistant to the Commandant
pending a permanent assignment within
the staff)

Frank E. Cole	1st Lt	USAF	29 Oct 1951
Wayne W. Eggert	1st Lt	USAF	4 Sep 1951
Leonard P. Farrell	Captain	USAF	9 Nov 1951
George Harchalk	Major	USAF	13 Nov 1951
Austin A. Julian Jr.	Major	USAF	5 Nov 1951
James S. Nash	1st Lt	USAF	4 Dec 1951
Jones P. Seigler	Captain	USAF	1 Nov 1951
Everest E. Riccioni	1st Lt	USAF	18 Mar 1952
Charles E. Yeager	Major	USAF	19 Oct 1951

CLASS 51-B

Joseph F. Belton Jr.	Captain	USAF	17 Mar 1952
Virgil C. Givens	Captain	USAF	1 Apr 1952
Richard J. Harer	Captain	USAF	2 Apr 1952
Earle D. Harper	Flt Lt	RCAF	10 Mar 1952
Herbert Z. Hopkins Jr.	1st Lt	USAF	27 Mar 1952
Julius H. Massey Jr.	Major	USAF	20 Mar 1952
Robert J. Pate	Captain	USAF	19 Mar 1952
James J. Vapenick	Captain	USAF	2 Apr 1952
August Vincenzi	Captain	USAF	2 Apr 1952

CLASS 51-C

David L. Baker	Civilian	CAA Rep	8 May 1952
Martin E. Collis Jr	Civilian	Chance-Vought Acft	12 May 1952
Russell H. Janzen	Flt Lt	RCAF	28 May 1952
John W. Konrad	Captain	USAF	19 May 1952
Newell H. Lynch	Captain	USAF	21 May 1952
Raymond S. Morris	Civilian	North American Aviation	20 May 1952
Raymond A. Popson	Captain	USAF	3 Jun 1952
Val E. Prael	Major	USAF	3 Jun 1952
Harold G. Russell	Major	USAF	19 May 1952
Robert R. Scott	Major	USAF	2 Jun 1952
Fred J. Wolfe	Major	USAF	20 May 1952

CLASS 52-A

Ronald M. Bauman	Flt Lt	RCAF	26 Aug 1952
Bernard J. Hughes	Civilian	Chase Acft Company	25 Aug 1952
Allen K. McGill	Captain	USAF	25 Aug 1952
Benjamin R. Ostlind	Major	USAF	2 Sep 1952
John A. Porter	1st Lt	USAF	25 Aug 1952
Van H. Shepard	Captain	USAF	29 Aug 1952
Rush R. Spradley	Major	USAF	26 Aug 1952
Alvin S. White	Major	USAF	22 Aug 1952

CLASS 52-B

John L. Armstrong	Major	USAF	26 Nov 1952
James J. Butler Jr.	Captain	USAF	21 Nov 1952
Fitzhugh L. Fulton Jr.	Captain	USAF	24 Nov 1952
Robert M. Howe	Major	USAF	11 Sep 1952

George R. Jansen	Civilian	Douglas Acft	28 Nov 1952
Thomas C. Kensler Jr.	Captain	USAF	21 Nov 1952
Bill H. Moranville	Captain	USAF	21 Nov 1952
Samuel P. Parsons	Major	USAF	
William S. Ross	Captain	USAF	20 Nov 1952
Joseph E. Simanonok	Captain	USAF	25 Nov 1952

CLASS 52-C

Oakley W. Baron	Major	USAF	6 Apr 1953
Theodore L. Billen	Captain	USAF	2 Apr 1953
James S. Carson	Captain	USAF	6 Apr 1953
Harold W. Christian	Captain	USAF	6 Apr 1953
Randall L. Fetty	Captain	USAF	6 Apr 1953
Charles L. Gandy	Captain	USAF	6 Apr 1953
James R. Gannett	Captain	USAF	6 Apr 1953
Clyde E. Good	Major	USAF	6 Apr 1953
David W. Howe	Civilian	Bell Acft	6 Apr 1953
Nello L. Infanti	Civilian	Cornell Aero-nautical Lab	6 Apr 1953
Richard C. Kennan Jr.	Captain	USAF	6 Apr 1953
William J. McCleary	Major	USAF	8 Apr 1953
Frederick A. Moore	Flt Lt	RCAF	8 Apr 1953
Orville O. Scroggin III	Captain	USAF	6 Apr 1953
Robert S. Turner	Civilian	Glen L. Martin Company	6 Apr 1953

CLASS 53-A

Ralph W. Broeske	Captain	USAF	7 Jul 1953
John H. Gregorious	Captain	USAF	6 Jul 1953
William H. Harse	Captain	USAF	6 Jul 1953
William J. Ingram	Civilian	North American Aviation	29 Jun 1953
James K. MacConnell	Captain	USAF	3 Jul 1953
Ralph W. Lusk Jr	Captain	USAF	6 Jul 1953
Willard L. Mitchell	1st Lt	USAF	3 Jul 1953
Howard J. Robertson	Flt Lt	RCAF	7 Jul 1953
Curtis P. Vester Jr	Major	USAF	6 Jul 1953

CLASS 53-B 2 Oct 1953

Harley E. Beard	Major	USAF
Rowland E. W. Blessley	Captain	USAF
Norman J. Glenn	Captain	USAF
Charles D. Hauver	Captain	USAF
Price E. Henry	Captain	USAF
Clayton S. Hoffman	Captain	USAF
Calvin L. Hull	Flt Lt	RCAF
Maurice C. Terry	Civilian	Convair
Brien S. Wygle	Civilian	Boeing Airplane

CLASS 53-C 31 Dec 1953

Wilbur A. Ballentine	Major	USAF
Robert D. Carpenter	Major	USAF
Stuart R. Childs	Captain	USAF
Eugene P. Deatrick Jr.	Captain	USAF
Anderson B. Honts Jr	Captain	USAF
Tracey B. Mathewson III	Captain	USAF
Jack Modica Jr	1st Lt	USAF
Samuel L. Wallick Jr	Civilian	Boeing Airplane

CLASS 53-D 2 Apr 1954

John J. Apple	Captain	USAF
Thomas R. Bogan	Captain	USAF
Walter F. Daniel	Captain	USAF
Charles A. Kitchens	1st Lt	USAF
Don A. Kuebler	Captain	USAF
Jack R. Lee	1st Lt	USAF
Kenneth K. Lewis	Major	USAF
William S. Reed	Captain	USAF
Robert H. Rice	Captain	USAF
William L. Schneider	1st Lt	USAF
Donald H. Stuck	Captain	USAF
Thomas M. Sumner	Captain	USAF

CLASS 54-A 2 Jul 1954

Charles C. Bock Jr	1st Lt	USAF
Dana W. Brown	1st Lt	USAF
Richard P. Chenot	Major	USAF
Loren W. Davis	Captain	USAF
Wilbur H. Leff	Major	USAF
Robert A. Masterson	Captain	USAF
Robert I. Quillen	1st Lt	USAF
James O. Rudolph	Major	USAF
Louis W. Schalk	Captain	USAF
Wilson Summers III	Captain	USAF
George W. Wegman	Captain	USAF
Harry C. White	Captain	USAF

CLASS 54-B 1 Oct 1954

Milburn G. Apt	Captain	USAF
William A. Cato	Captain	USAF
Norvin C. Evans Jr	Captain	USAF
Charles A. Neyhart	Captain	USAF
Ross B. Patrick	Civilian	Boeing Airplane
James O. Roberts	Civilian	North American Aviation
Robert F. Titus	1st Lt	USAF
John E. Todnem	Civilian	McDonnell Acft Corp
Arthur S. Witchell	Civilian	Convair
Francis L. Wright	Captain	USAF

CLASS 54-C 17 Jan 1955

John M. Carlson	1st Lt	USAF
Philip C. Davis Jr	1st Lt	USAF
James W. Empey	Captain	USAF
Robert H. Jacobson	1st Lt	USAF
Robert G. Ferry	Captain	USAF
Edward M. Nebinger	Captain	USAF
Richard O. Ransbottom	Captain	USAF
Peter Van Matre	Captain	USAF
Robert P. Walker	Captain	USAF
Robert M. White	Captain	USAF
Roscoe B. Tanner	Captain	USAF

CLASS 55-A 15 Aug 1955

Tommie D. Benefield	Captain	USAF
William W. Brothers Jr	Captain	USAF
Paul R. Christian	Captain	USAF
Dennis J. Clark	Captain	USAF
John T. Dolan	Captain	USAF
George T. Dwyer	Captain	USAF
Edward C. Gahl	Captain	USAF
Joe B. Jordan	Captain	USAF
Patrick H. Kenney Jr	Major	USAF
Reese S. Martin	Captain	USAF
David S. Melliush	Captain	USAF
Frank B. Seaman	Captain	USAF
Donald C. Smith	Captain	USAF

CLASS 55-C 6 Jan 1956

Oliver P. Arquilla	Captain	USAF
Kenneth F. Bailey	Captain	USAF
James L. Brooks	Civilian	North American Aviation
Harry A. Brown Jr	Captain	USAF
Donald A. Deans	Flt Lt	RCAF
Robert S. Fogg Jr	Captain	USAF
John H. Fowler Jr	Captain	USAF
Herbert V. Leonhardt	Lt Col	USAF
George B. Lyle	Captain	USAF
Ralph S. Matsen	Captain	USAF
Swart H. Nelson	Captain	USAF
Donald K. Slayton	Captain	USAF
Donald M. Sorlie	Captain	USAF
Willum H. Spillers Jr	Captain	USAF

CLASS 55-D 6 Apr 1956

James W. Bradbury	Captain	USAF
Ernest E. Bradley Jr	Captain	USAF
Russell A. Bunn	Captain	USAF
Minnis C. Harr	Captain	USAF
Hugh P. Hunerwadel	Captain	USAF
Howard M. Lane	Major	USAF

Richard C. Lathrop	Major	USAF
James A. Lucey	Captain	USAF
Milton E. Nelson	Major	USAF
David H. Tittle	Captain	USAF
George Eaton	Civilian	McDonnell

CLASS 56-A 6 Jul 1956

Floyd B. Brown Jr	Captain	USAF
John K. Campbell	Captain	USAF
Edwin G. Chaplin	Captain	USAF
William E. Haynes	Captain	USAF
Alvin G. Moore	Captain	USAF
Stephen E. Moore	Captain	USAF
Joe S. Schiele	Captain	USAF
Robert W. Smith	Captain	USAF
Henry A. Streb Jr	Captain	USAF
Smith Swords III	Captain	USAF
Harold K. Wimberley	Captain	USAF
Wendell H. Shawler	1st Lt	USAF
Robert M. Taylor	Flt Lt	RCAF
Gage Mace Jr	Civilian	North American Aviation

CLASS 56-B 1 Oct 1956

Donald C. Anderson	Civilian	Convair
Weldon T. Armstrong Jr	Captain	USAF
Charles E. Klobassa	Captain	USAF
Gerald E. Lyvere	Captain	USAF
Thomas U. McElmurry	Captain	USAF
Robb R. Satterfield	Captain	USAF
Russell E. Taliaferro	Captain	USAF
Billy P. White	Captain	USAF
Robert H. Sayre	Captain	USAF

CLASS 56-C 3 Jan 1957

Arthur E. Beaird	Captain	USAF
Eugene O. Conley	Captain	USAF
Hal L. Fitzpatrick	Captain	USAF
Neil R. Garland	Captain	USAF
Jesse E. Green	Captain	USAF
Paul R. Hinckley	Captain	USAF
Gerald E. King	Captain	USAF
Thurman Lawrence Jr.	Captain	USAF
James J. King	Captain	USAF
Frederick C. O'barr	1st Lt	USAF
Roger N. Mercer	Captain	USAF
Robert A. Rushworth	Captain	USAF
Click D. Smith Jr.	Captain	USAF
Alonzo T. Walter Jr	Captain	USAF
Robert J. Welch	Captain	USAF

CLASS 56-D 3 Apr 1957

Joseph B. Moore	Major	USAF
Thomas R. Risher III	Major	USAF
Joseph W. Rogers	Major	USAF
Richard H. Sorenson	Major	USAF
Leroy G. Cooper Jr	Captain	USAF
Joseph S. Edwards	Captain	USAF
Richard M. Gough	Captain	USAF
Virgil L. Grissom	Captain	USAF
Walter J. Hodgson	Captain	USAF
Robert O. Littell	Captain	USAF
Jack B. Mayo	Captain	USAF
William L. Skliar	Captain	USAF
James W. Wood	Captain	USAF
Thomas W. Gillespie Jr	Civilian	Beech Acft
Martin J. Signorelli Jr	Civilian	Republic Aviation

CLASS 57-A 3 Jul 1957

William S. Miller	Lt Col	USAF
Robert S. Buchanan	Captain	USAF
Wilbur J. Giesler	Captain	USAF
Orgle D. Godwin	Captain	USAF
George D. Hendrix	Captain	USAF
Donald A. Kaenlert	Captain	USAF
William R. Lake	Captain	USAF
Richard Lamprecht	Captain	USAF
John H. Saxon Jr	Captain	USAF
Charles P. Thomas	Captain	USAF
Robert E. Williams	Captain	USAF
John A. Melenric	Civilian	Cessna Acft
Jack D. Wells	Civilian	Northrop Acft

CLASS 57-C 3 Jan 1958

Leo F. Post Jr	Captain	USAF
Edwards J. Brisick	Captain	USAF
Grant S. Christensen	Captain	USAF
Henry C. Gordon	Captain	USAF
John A. Hambleton	Captain	USAF
Jerry Hanjian	Captain	USAF
Norris J. Hanks	Captain	USAF
Byron F. Knolle Jr	Captain	USAF
John Prodan	Captain	USAF
John L. Whitehead Jr	Captain	USAF
Richard C. Zimmerman	Captain	USAF
Robert N. Broughton	1st Lt	USAF
Frank D. Frazier	1st Lt	USAF
George H. Knight	Flt Lt	RCAF
Jack N. Funk	Civilian	Boeing Airplane
James D. Webber	Civilian	Beech Acft

CLASS 57-D 2 Apr 1958

Guy C. Cisco Jr	Captain	USAF
Leo M. Dove	Captain	USAF
Rene L. Farsy	Captain	France
James K. Gleoggler	Captain	USAF
Samuel A. Groening	Captain	USAF
Clarence E. Kerr	Captain	USAF
Philip R. O'Brien Jr	Captain	USAF
Francis R. Plessier	Captain	France
Joseph C. Romack	Captain	USAF
Vernon H. Sandrock	Captain	USAF
Marvin O. Weber Jr	Captain	USAF
George L. Draper	1st Lt	USAF
Robert E. Ross	1st Lt	USAF
Donald W. Moore	Flt Lt	RCAF

CLASS 58-A 2 Jul 1958

Robert G. Bell	Captain	USAF
Roland M. Brunelle	Captain	USAF
Richard M. Corbett	Captain	USAF
Halvor M. Ekeren	Captain	USAF
Kenneth W. Grubaugh	Captain	USAF
Gerald A. Hattendorf	Captain	USAF
Archie T. Iddings	Captain	USAF
Herman L. Knapp	Captain	USAF
Jesse C. Locke Jr	Captain	USAF
Jimmie Pierce	Captain	USAF
Ralph C. Rich	1st Lt	USAF
Donald W. Stewart Jr	Captain	USAF
William R. Wronski	Captain	USAF
Henry E. Chouteau	Civilian	Northrop Acft
Jack H. Stephenson	Civilian	Grumman Acft

CLASS 58-B 2 Oct 1958

Shelton J. Anthony Jr	Captain	USAF
Clifford H. Diercks	Captain	USAF
Edward G. Givens Jr	Captain	USAF
Richard E. Merkling	Captain	USAF
William J. Watson	Captain	USAF
James M. Keel Jr	1st Lt	USAF
Larry D. McClain	1st Lt	USAF
Irving L. Burrows Jr	Civilian	McDonnell
James E. Kirkpatrick Jr	Civilian	Cessna
Frederick W. Spofforth	Civilian	Boeing Airplane

CLASS 58-C 24 Apr 1959

Donald F. Casey	Captain	USAF
John H. Craigie	Captain	USAF
Samuel M. Guild Jr	Captain	USAF
Joseph A. Guthrie Jr	Captain	USAF
Lloyd M. Johnson	Captain	USAF
William J. Knight	Captain	USAF

Joseph G. Kondracki	Captain	USAF
Charles F. G. Kuyk Jr	Captain	USAF
Harvey W. Prosser Jr	Captain	USAF
Russell L. Rogers	Captain	USAF
Philip T. Smith	Captain	USAF
Thomas P. Stafford	Captain	USAF
Emil Sturmthal	Captain	USAF
Alfred H. Uhalt Jr	Captain	USAF
Edgar K. Wilson	Captain	USAF

CLASS 59-A 21 Aug 1959

Paul J. Balfe	1st Lt	USAF
Franco Bonazzi	Captain	Italy
Loren R. Brooks Jr	Captain	USAF
Homer J. Carlile	Captain	USAF
Kenneth H. Coffee	Captain	USAF
Carl J. Copeman	Captain	USAF
Henry B. Dees	Civilian	Lockheed
Jon H. Ertzgaard	1st Lt	Norway
Jack W. Gillette	Major	USAF
James C. Horsley Jr	Captain	USAF
Arne Madsen	1st Lt	Norway
Philip E. Neale Jr	Captain	USAF
Robert L. Straub	Captain	USAF
William T. Twinting	Captain	USAF
Lorne V. Ursel	Civilian	Canada

CLASS 59-B 17 Dec 1959

Richard S. Bearman	Captain	USAF
Mervin L. Evenson	Captain	USAF
Jimmie S. Honaker	Captain	USAF
Budd F. Knapp	Captain	USAF
William R. Looney	Captain	USAF
John H. Ludwig	Captain	USAF
Donald P. Maslen	Captain	USAF
John C. McClure	Captain	USAF
Robert L. Mosley	Captain	USAF
Foster A. Post	Captain	USAF
James C. Scheuer	Captain	USAF
Cecil B. Smith	Captain	USAF
Rial D. Lowell	1st Lt	USAF
Ralph C. Cokeley	Civilian	Boeing Airplane
Harry E. Terrell Jr	Civilian	Douglas Acft

CLASS 59-C 22 Apr 1960

Tommy I. Bell	Captain	USAF
Heinz Birkenbeil	Captain	Germany
Weldon L. Burden	Captain	USAF
Fred J. Cuthill	Captain	USAF
John J. Davey	Captain	USAF
Raymond C. Grazier	Captain	USAF
Robert R. Heaton	Captain	USAF
Francis M. Kavanagh	Captain	USAF

Raymond J. Koski	Major	USAF
James A. McDivitt	Captain	USAF
Frank D. Melton	Civilian	FAA
Robert G. Nabors	Captain	USAF
Harvey J. Royer	Captain	USAF
Donald E. Westbrook	Captain	USAF
Edward H. White II	Captain	USAF
George A. Williams Jr	Major	USAF

CLASS 60-A 19 Aug 1960

Gene L. Colvin	1st Lt	USAF
Albert H. Crews Jr	Captain	USAF
Carl S. Cross	Captain	USAF
William R. Davis	Captain	USAF
Oluf Eriksen	1st Lt	Denmark
Donald L. Evans	Captain	USAF
Robert J. Greuel	Captain	USAF
Edwin J. Hatzenbuehler Jr	Captain	USAF
Lachlan Macleay	Captain	USAF
Richard W. Phillips Jr	Captain	USAF
John H. Reddoch	Captain	USAF
Kenneth E. Stout	Captain	USAF
Robert J. Vanden-Heuvel	Captain	USAF
Hubert E. Thornber Jr	Captain	USAF

CLASS 60-B 16 Dec 1960

Paul R. Curry	Captain	USA
John C. Geary	Major	USA
John A. Johnston	Captain	USA
Emil E. Kluever	Captain	USA
Emery E. Nelson	CWO	USA
Lavern R. Riesterer	Captain	USA
Joseph C. Watts	CWO	USA

CLASS 60-C 21 Apr 1961

Russell P. Bement	Captain	USAF
Frank Borman	Captain	USAF
Michael Collins	Captain	USAF
Charles J. Doryland	Captain	USAF
Luciano Guida	Captain	Italy
James B. Irwin	Captain	USAF
Carl H. Jacobson	Civilian	FAA
Harley A. Johnson	Captain	USAF
Yahiko Kanki	Major	Japan
William R. Loewe	Captain	USAF
Francis G. Neubeck	Captain	USAF
Flemming R. S. Rasmussen	1st Lt	Denmark
William G. Reschke Jr	Captain	USAF
Jack E. Tyson	Captain	USAF

CLASS 61-A 18 Aug 1961

Mitsuru Asai	Captain	Japan
Robert L. Baldwin	Captain	USAF
Thomas E. Edmonds	Civilian	Boeing Airplane
George D. Knutkowski	Captain	USAF
William H. Lawton Jr.	Captain	USAF
Peter W. Odgers	1st Lt	USAF
Antonius P. Okkerman	1st Lt	Netherlands
Robert L. Reagan	Captain	USAF
Edmund E. Schultz	1st Lt	Germany
George M. Simpson	Captain	USAF
Arthur Torosian	Captain	USAF
David D. Young	Captain	USAF

CLASS 61-C 19 Apr 1962

Charles S. Aldrich	Captain	USAF
Denis N. Bailey	Flt Lt	RCAF
Luigi P. Barbero	Captain	Italy
Roy S. Dickey	Captain	USAF
Joe H. Engle	Captain	USAF
Lars E. Johansson	Lt	Sweden
Alvinus P. Johnson	Captain	USAF
William D. Leng	Captain	USAF
Frank E. Liethen Jr	Captain	USAF
Clive P. Loubser	Flt Lt	RCAF
James N. McClelland	Captain	USAF
Robert H. McIntosh	Captain	USAF
Edmond R. Ringman	Captain	USAF
Giorgio Santucci	Captain	Italy
John N. Sexton	Captain	USAF



APPENDIX C

Appendix C Summary

	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
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APPENDIX D

CURRICULUM

PART I-EXPERIMENTAL TEST PILOT COURSE

Section I, Performance Phase-Academic

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Calculus Review	7:00	Review of differential and integral calculus.
Physics Review	2:00	Review of forces, moments, work, energy, power, and equations of motion.
Aerothermodynamics	4:00	Review of fluid mechanics and thermodynamics, and three hours of instruction on conservation equations, basic equations and definitions, and pressure, temperature, and density relationships.
The Atmosphere	2:00	Definitions, standard atmosphere, thermodynamic properties, equations and the altimeter.
Introduction to Performance Testing	1:00	Role of performance and stability testing in the category test program plus an introduction to the course curriculum, both academic and flying.
Introduction to Calibration Testing	1:00	Calibration of pitot-static and temperature probe systems and the general tests (pacer, speed course, tower fly-by, smoke trail, high altitude speed course) used to calibrate these instrument systems.
Introduction to Category Testing	1:00	Summary of the general concepts of category testing as utilized in Air Force Systems Command.
Performance In-flight Techniques	1:00	Three prerequisites for successful testing: Organization, Attitude Flying, and Trim.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Airspeed System Theory	2:00	Review of Euler's equation, Bernoulli's equations, calibrated and equivalent airspeed, and compressibility correction factor.
Instrumentation	6:00	General theory of calibrating instruments, hysteresis effects, and the technical difference between a calibration factor and error.
Pacer Test	1:00	Theory, flight test techniques, and data reduction methods used.
Lift	2:00	Lift equations, lift coefficients, lift curves, Reynolds number effects, and Mach number effects.
Drag	2:00	Types of drag and the drag polars.
Low Altitude Speed Course Test	1:00	Theory, flight test techniques, and data reduction methods used.
Sawtooth Climb Test	1:00	Theory, flight test techniques, and data reduction methods used.
Report Writing	2:00	Standard engineering graphs, curve plotting techniques, and specific requirements for student flight test reports.
Performance Equations	1:00	Deriving the equations governing level, gliding, and climbing flight.
Moments	1:00	Developing center of pressure, aerodynamic chord, and moment coefficients.
Aircraft Structures	2:00	Static strength, service life, strength-rigidity, requirements, and the effect of these requirements on airplane design and operation.
Tower Fly-by Test	1:00	Theory, flight test techniques, and data reduction methods used.
Level Flight Acceleration Test	1:00	Theory, flight test techniques, and data reduction methods used.
Drag and Power Characteristics	1:00	Determine speeds for maximum level flight, minimum drag, minimum rate of descent, and maximum rate of climb.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Effects of Temperature, Altitude, Density, and Weight on Drag and Power Curves	1:00	Factors which effect drag and power curves.
PIW-VIW Curves	1:00	Drag-Power curve for reciprocating engines and the use of this curve in flight test to obtain the drag polar of an aircraft.
Speed Power Constant-Altitude Test	2:00	Flight test techniques and data reduction methods used.
Temperature Probe Calibration	1:00	Theory, flight test techniques, and data reduction methods used.
Electronic Data Processing	8:00	Use of cybernetics and digital computers.
Check Climb and Descent Theory	3:00	Apparent rate of climb, temperature corrections to pressure altitude, thrust horsepower available and required, and weight, wind, and acceleration corrections to obtain standard day climb data.
Reciprocating Engine and Turbojet Engine Check Climb Tests	2:00	Flight test techniques and data reduction methods used in check climb tests.
W/§ Aerodynamic Theory	2:00	Drag-Mach number relationships, C_L and C_D - Mach number relationships, and the Buckingham Pi theory for turbojet engine and performance analysis.
Speed Power Constant W/§ Test	2:00	Flight test techniques and data reduction methods used.
Skin Friction Drag	2:00	Critical Reynolds number of boundary layers and laminarization.
Pressure Drag	2:00	Drag of a sphere, equivalent parasite and flat plate area drag, separation, and aerodynamic analysis.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Induced Drag	2:00	Types of potential flow, bound and trailing vortices, upwash and down wash, circulation theory, and Oswald's efficiency factor.
Theory of Performance Data Corrections	2:00	Theoretical considerations used to reduce performance data to standard day conditions.
Energy Concept of Flight Testing	2:00	Specific energy equations, three-dimensional analysis, unsteady performance methods, and use of data to obtain accelerations, climbs, zoom climbs, turning, and cruise performance.
High Speed Calibration	1:00	Pitot-static calibration methods used in transonic and supersonic flight.
Propellers	2:00	Momentum theory and blade element theory.
Turning Performance	2:00	Theory, flight test techniques, and data reduction methods used.
Range and Endurance Theory	2:00	Brequet range and endurance equations with practical application to turbojet, turboprop, and reciprocating engine flight.
Cruise Performance Test	2:00	Flight test techniques and data reduction methods used.
Takeoff and Landing Test	5:00	Forces acting on an aircraft during ground roll and the transition and air phases, and assisted takeoff; high lift and drag devices, flight test techniques, and data reduction methods.
Compressible Flow and Shock Theory	7:00	Developing speed of sound, Mach number, Mach wave, convergent and divergent nozzles, discontinuity flow, entropy considerations, oblique shock waves, use of shock tables, normal and oblique shock inlets, and variable geometry inlets.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Prandtl-Meyer Expansion	1:00	Basic theory and use of shock tables for Prandtl-Meyer expansion.
Supersonic Airfoils	2:00	Lift, drag, center of pressure, flow patterns, wave drag, and approximate theories.
Transonic Aerodynamics	3:00	Compressibility effect, critical Mach number, drag rise (compressibility drag), shock wave patterns, performance equations, undesirable transonic effects, and methods of reducing transonic drag.
Engines, General	2:00	Propulsive efficiency, types of power plants, thrust equations, P-V diagrams, Otto cycle, Brayton cycle, and Diesel cycle.
Reciprocating Engines	1:00	Brake and indicated horsepower, indicator card, prony brake, supercharging, critical altitude, design and use of engine charts.
Turbojet Engines	3:00	P-V diagrams, thrust determination, and thrust-rpm relationships for turbojet engines.
Turbojet Engines	2:00	Theory of operation and design problems.
Ram Jet Engines	2:00	Principles of operation, and effect of speed on performance and fuel economy.
Rocket Engines	2:00	Principles of operation, effect of speed on performance, and fuel economy.
TOTAL	<u>114:00</u>	

Section II, Performance Phase-Flying

<u>Test</u>	<u>Type Aircraft</u>	<u>Flying Time</u>
Checkout	T-33	1:30
Checkout	T-38	4:00
Pace	T-38	2:30
Tower Fly-by	T-38	2:00
Sawtooth Climb	T-38	2:30
Accelerations	T-38	4:00
Accelerations	F-104B/F-106B	2:00
Check Climb	T-38	2:30
W/½ Speed Power	T-38	2:30
Range Mission	T-33	2:30
Range Mission	T-38	1:30
Qualitative Evaluation	T-38	5:00
Qualitative Evaluation	F-104F/F-106B	1:30
Energy Management	F-104B/F-106B	1:30
Takeoff Tests	T-33/T-38	None additional
Special Projects	T-33/T-38	1:30
Safety Observer/Copilot	T-33/T-38	36:00
AFM 60-1 Requirements (Instrument and Night)	T-33	12:00
TOTAL		85:00

Section III, Stability and Control Phase - Academic

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Introduction	2:00	Types of stability, aircraft handling qualities, and Military Specification F-8785.
Weight and Balance	2:00	Determining effects of cg (center of gravity) shift on stability and determination of aircraft cg limits.
Instrumentation	6:00	Types of instrumentation and operating principles and procedures.
Review of Aerodynamics	2:00	Review of terms specifically related to stability analysis.
Technical Report Writing	2:00	Techniques and procedures used to present stability and control data in technical reports.
Stalls	4:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Longitudinal Static Stability	25:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Maneuvering Flight Stability	10:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Lateral-Directional Stability	10:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Asymmetric Power	4:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Trim Changes	2:00	Military specification requirements, flight test techniques, and data reduction methods used.
Dynamic Stability	20:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Spins	4:00	Theory, military specification requirements, flight test techniques, and data reduction methods used.
Control Systems	8:00	Theory of various types.
High Speed Stability	12:00	Theory of high speed stability.
Rotary Wing	4:00	Theory of rotary wing aircraft.
Qualitative Flight Testing	6:00	Flight test planning and flight techniques.
TOTAL	123:00	

Section IV, Stability and Control Phase-Flying

<u>Test</u>	<u>Type Aircraft</u>	<u>Flying Time</u>
Stalls	B-57	4:00
Longitudinal Static Stability	T-33/T-38	4:00
Maneuvering Flight Stability	T-33/T-38	4:00
Sideslips	T-33/T-38	2:00
Aileron Rolls	T-33/T-38	2:00
Asymmetric Power	B-57	2:00
Trim Changes	B-57	1:00
Spins	T-33	5:00
Dynamics	B-57	2:00
Qualitative	F-100/F-104/ C-130/B-47/ B-52	3:00
Special Project	T-33/T-38/B-57	3:00
Safety Observer/Copilot	T-33/T-38	14:00
AFM 60-1 Requirements (Instrument and Night)	T-33	12:00
TOTAL		58:00

Section V, Special Seminars

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
(Change from Class to Class)	28:00	New systems proposed and under development. New testing methods. Test programs in-being. Missions of various AFSC Centers.

PART II-AEROSPACE RESEARCH PILOT COURSE

Section I, Academic Program

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Mathematics Review	26:00	Analytic geometry, vector analysis, advanced calculus, differential equations, and operational mathematics.
Engineering Review	10:00	Classical mechanics, equations of motion of a rigid body, electrical theory, and an introduction to atomic physics.
Celestial Navigation	5:00	Theory and application of conventional Celestial navigation followed by theory and techniques of space navigation.
Computers	15:00	Analog and digital theory and operation with actual laboratory work.
The Aerospace Environment	30:00	Astronomy, introduction to relativity, conventional and upper atmosphere meteorology, aeronomy, and solar and cosmic radiation.
Bioastronautics	42:00	This instruction provides the student with general physiological knowledge applicable to performance in the space environment. Course content is: Biological implications of physics of the atmosphere and space. Basic principles of human physiology. The acceleration environment of space flight in terms of its physiological implications and protective devices against accelerative stress. Psychological implications of the space environment. Physiological implications of weightlessness with specific reference to cardiovascular implications and altered sensory perception. The radiation environment of space and its biological implications. The

rationale of biomedical monitoring and biomedical monitoring techniques and procedures. Demonstration of biomedical monitoring procedures in the in-flight environment of high performance aircraft. Closed ecological systems in general terms and the important features of each type of closed ecological system. The medical basis for examination procedures for astronauts. Basic principles of self-aid in the space flight situation. And communication procedures for the transmittal of medical information from space vehicles.

<u>Subject</u>	<u>Hours</u>	<u>Description</u>
Flight Mechanics	40:00	Orbital mechanics, space operations (orbital transfer, navigation, rendezvous, and docking), launch and ascent, re-entry mechanics (ballistic and lifting), and related heating problems.
Heating and Aerodynamic Theory	30:00	Compressible flow, aerodynamic heating, real gas effects, heat transfer, and vehicle dynamics.
TOTAL	198:00	

Section II, Aerospace Course-Flying

<u>Mission</u>	<u>Type Aircraft</u>	<u>Flying Time</u>
Checkout and Familiarization	F-104A	7:00
Checkout and Familiarization	F-104B	3:00
Review of conventional stability and control testing techniques	F-104A/B	6:00
Non-steady testing techniques	F-104A/B	2:00
Envelope Expansion	F-104A/B	6:00
Flight Corridors (Simulated re-entry)	F-104B	2:00
Low L/D landings	F-104A/B	8:00
Energy Management	F-104A/B	14:00
Checkout and Familiarization	F-106	5:00
Low L/D landings	F-106	5:00
Checkout and Familiarization (Low L/D landings and energy management)	T-38	5:00
Spins	T-33	2:00
AFM 60-1 proficiency requirements	T-33	20:00
TOTAL		85:00

Section III, Aerospace Course-Simulator Program

This portion of training is designed to permit the student to investigate vehicle characteristics and maneuvers which he could not easily or economically perform in flight.

	<u>Simulator Flying Time</u>
Interim Static Simulator	
Familiarization	3:00
F-104 simulation	2:05
Sub-orbital re-entry simulation (Ballistic)	1:00
Sub-orbital re-entry simulation (Lifting)	2:00
Super-orbital re-entry (Ballistic)	1:00
Super-orbital re-entry (Lifting)	1:00
Boost simulation	1:00
Orbital Rendezvous Simulator (Includes various methods of rendezvous)	6:00
Ballistic Control Simulator	
Familiarization	3:00
F-104 rocket simulation	1:00
Re-entry simulation (Ballistic)	2:00
Re-entry simulation (Lifting)	1:00
Orbital rendezvous	1:00
Centrifuge Re-entry Simulation (Johnsville)	
Boost simulations	
Re-entry simulation (Ballistic, semi-ballistic, and lifting)	

Space Simulator (Chance-Vought, Dallas, Tex)

Section IV, Aerospace Course-Consultant and Advisory Program

<u>Subject</u>	<u>Source</u>	<u>Advisor/Consultant</u>
Space Navigation	North American Aviation	Space and Information Div.
Lifting body re-entry	Martin	Baltimore
Lifting body re-entry	NASA	Ames
Hypersonic re-entry	Boeing	Dr. Usaf A. Yoler
Celestial navigation	Univ of Michigan	Prof. Harry C. Carver
Astronomy	Griffith Observatory	Dr. C. D. Clemenshaw
On-Base Seminars	AFFTC Manned Spacecraft Br	
X-15		Maj Robert M. White
Low L/D Landings		Mr. Robert G. Hoey
Free Molecule Flow		Mr. Kirk Irwin
Rockets	Rocket Research Laboratory	
Current Development and Advanced Plans (Field Trips)	Martin Boeing	Douglas North American Aviation Norair Lockheed



APPENDIX E

BIOGRAPHICAL SKETCHES

Lieutenant Colonel John R. Amann

Lieutenant Colonel John R. Amann was born in Queens, New York on October 25, 1919, the son of Mr. and Mrs. John Amann. After graduating from Grover Cleveland High School in New York City, he attended the University of Alabama, graduating in 1941 with a Bachelor of Science degree in aeronautical engineering. Post-graduate work was accomplished at Princeton University where he received his Master's degree in aeronautical engineering in 1947.

Entering the service in March of 1941, Colonel Amann attended the Air Force Pilot Training School of the Southeast Training Command. He received his commission as a Second Lieutenant and his pilot's wings in December, 1941. He also attended the Air Force Engineering School and the Test Pilot School in 1944 and 1945, respectively, at Wright Field, Dayton, Ohio. He is also a graduate of the Air Command and Staff School which was then located at Fort Leavenworth, Kansas.

Colonel Amann served in Burma, India and China during World War II, flying 54 combat missions in B-25's. He was Squadron Operations Officer and later served as Deputy Group Operations Officer. In 1949 he was assigned as Chief of the Experimental Test Pilot School at Wright-Patterson AFB, Ohio. In May of 1951, he was transferred to Edwards AFB as Chief of the Air Force Experimental Flight Test Pilot School.

A Senior Pilot, the Colonel has flown the P-40, P-39 and P-51, and is currently checked out to fly the C-47, C-54, B-25, B-26, B-57, F-80 and F-84 aircraft. He has logged over 3300 hours of flying time. Among his decorations and awards are the Distinguished Flying Cross with one Oak Leaf Cluster, the Air Medal, American Defense Medal, Asia-Pacific Medal, World War II Victory Medal, American Theater Medal, and the National Defense Service Medal.

As of 1955

**Lieutenant Colonel
Herbert V. Leonhardt**

Colonel Leonhardt became Commandant of the USAF Experimental Flight Test Pilot School on 25 May 1956 after graduating with Class 55-C in January 1956. His formal education included a Bachelor of Science degree in aeronautical engineering from Virginia Polytechnic Institute and a Master of Science in aeronautical engineering from Princeton University.

He received a promotion to Colonel on 24 April 1959 and departed the AFFTC in early July that same year for the Air War College.

Major Richard C. Lathrop

Major Lathrop graduated from the USAF Experimental Flight Test Pilot School in April 1956 with Class 55-D. Following graduation he was assigned to the AFFTC and to duty as Chief of the Training and Operations Branch, USAF Experimental Flight Test Pilot School. He continued in that capacity until becoming commandant of the school on 29 June 1959.

Major Lathrop graduated from the University of Wisconsin with Bachelor of Science, Master of Science, and Doctor of Philosophy degrees. He departed Edwards AFB on 17 June 1961 for the Air Force Academy where he was slated to become an instructor.

Lieutenant Colonel Robert M. Howe

Lieutenant Colonel Howe succeeded Major Richard C. Lathrop as Commandant USAF Experimental Flight Test Pilot School on 17 June 1961.

Prior to becoming Commandant of the USAF Experimental Flight Test Pilot School, Lt Colonel Howe was Chief of the Inspection Services Branch, Office of the Inspector General, AFFTC. Born in Orange, New Jersey, on 12 November 1919, Lt Colonel Howe attended Darien High School, Darien, Connecticut, and received a degree in electrical engineering in 1941 from Norwich University, Northfield, Vermont. He was with the Air Transport Command in the China-Burma-India Theatre during World War II flying the Hump (India to China) in C-46 aircraft. From 1949 to 1954 he was assigned to what was then called the Flight Test Division of Air Materiel Command, Wright-Patterson AFB.